



Students' Written Communication Skills in Science Learning

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Abstract: Communication skills are one of the skills needed by humans in the 21st century. Mathematical communication skills are very important for every student to have, this is useful so that students can understand the problems in science learning given and students are able to express their ideas in solving these problems. This study aims to describe the level of students' written communication skills in science learning. The type of research used is survey research. The sample of this research was 53 respondents of class VIII MTsN 4 Bengkalis. Data collection were techniques in the form of giving a test totaling 10 questions. The questions used refer to 4 aspects of communication skills, namely, 1) Changing the form of data presentation, 2) The accuracy of the use of notation, vocabulary, sketches, graphs, tables, and pictures, 3) The suitability of writing problem-solving steps, 4) Making conclusions. The average percentage of students' written communication skills for each aspect and each indicator is; 1) 72,96 for indicators changing the presentation of data, 2) 44,03 for indicators using graphs, tables, and diagrams, 3) 24,29 for indicators explaining events or experimental results and 4) 47,88 for concluding. In all aspects of written communication, the average score obtained is 47.29, which is included in the poor category.

Keywords: written communication skills, survey research, science learning

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INTRODUCTION

21st century skills are abilities that are important for society globally in facing 21st-century competition. The 21st century world is known for technological advances so HR (Human Resources) is starting to be replaced with technological sophistication, thus the competencies possessed by humans today can no longer follow the standard that existed in the past (Hidayah et al., 2017). Partnership for 21st century (2019) in the framework for 21st century learning says there are 4 important elements to ensure 21st century readiness for students. One of them is Learning and Innovation Skills-4Cs, students must prepare 4 important aspects, namely; 1) Creativity and innovation, 2) Critical thinking and problem solving, 3) Communication, and 4) Collaboration. This is useful for the increasingly complex life and works environment in today's world. The same thing is stated in the Regulation of the Minister of Education and Culture of the Republic of Indonesia (Permendikbud) No. 81A of 2013 concerning the implementation of the curriculum that students must have the ability to communicate, think critically and creatively to be able to live in a global society. One aspect of 21st century skills is communication skills.

Communication is an important skill in human interaction (Simsek & Ardem, 2020). In the learning process, communication can encourage improvements in quality and effectiveness in successful learning at all levels (Hastuti, 2018). Communication skills are one of the important skills in science learning because in the learning process students are required to read as well as present material in written and oral form (Melyanti, 2019), and both primary and secondary schools are required to be able to communicate. both orally and in writing (Kadarisma, 2018). Communication is divided into several forms, one of which is verbal communication. Types of verbal communication include listening, speaking, reading, and writing. Written communication is part of verbal communication (Churiyah, 2011). Written communication is the process of conveying ideas in written form (Wardhana, 2018).

In a previous study, observations were made on the profile of students' written communication skills in Europe which showed that the average written communication ability was 29.2% (Sonseca et al., 2015). In addition, observations were also made in the Bengkalis district, where students' communication skills were in a low category. that is about 63% of students rarely or never make graphs and tables and rarely ask questions. The students' lack of courage to answer questions can be seen in 65% of teachers who agree that only one or two students respond during learning.

In the learning process, an approach is used so that students can achieve learning objectives. One approach that is often used in science learning is a scientific approach known as 5M which includes: observing, asking, trying, reasoning, and communicating. The stage that is rarely carried out is the stage of communicating.

One of them is the students' written ability (Yusefni & Sriyati, 2016).

Some factors that cause students' low communication skills are described by Tandilling (2012), Rena et al. (2018) that teachers rarely test communication questions regularly, teachers only test questions that are glued to textbooks, and do not practice questions for higher-order thinking. The same thing was also stated by Yusefni & Sriyati (2016), Meliani & Retnaningrum (2018), Rizta & Antari (2018) that teachers rarely give questions that can stimulate students' written communication skills, besides, the limited learning time is not enough to test students' abilities. Based on this explanation, it can be seen that communication skills are essential for students, but the description of the level of communication skills is not yet known. So it is necessary to conduct a survey to determine the level of written communication skills in science learning. The indicators for written communication skills were adapted from several previous researchers Rosiani et al. (2020), Ningrum (2017), Ika (2018), and Yusefni & Sriyati (2016) that is:

- Aspects of changing the form of data presentation
- Aspects of the accuracy of the use of notation, vocabulary, sketches, graphs, tables and pictures
- The suitability of writing the completion steps with the problem presented
- Making conclusions.

METHODS

This research is qualitative descriptive research because the researcher will describe the students' written communication skills. This study aims to obtain an overview of the characteristics of the population described by the sample. This research was conducted in one of the Madrasah Tsanawiyah, Bengkalis Regency, Riau Province, Indonesia. The research instrument used as a measuring instrument was a written test, which consisted of 10 questions that were tested on 53 students. An example of a communication problem is shown in the following picture:

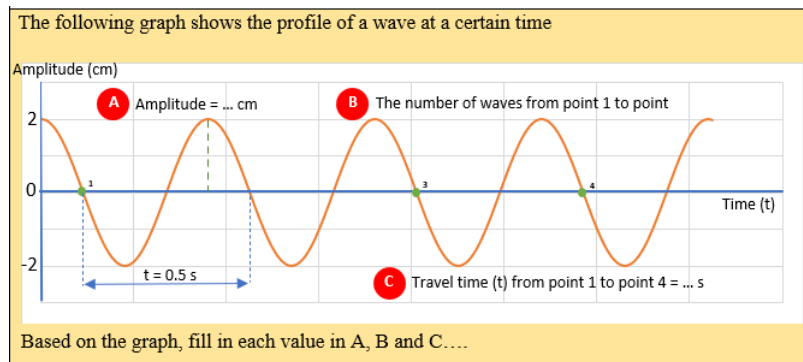


Figure 1. Examples of Written Communication Problems

The picture shows one of the written communication questions that have been tested on students. The ten questions given had been tested for validity by two expert validators. To measure students' written communication skills in answering questions, the researchers used indicators that can be seen in Table 1.

Table 1. Aspects and Indicators of Written Communication Ability

Aspect	Indicator
Changing the form of data presentation	• Change the form of data presentation into graphs, diagrams, pictures, or tables
Accurate use of notation, vocabulary, sketches, graphs, tables, and pictures	• Using graphs, diagrams, models, and tables and given the right information and the appropriate scale.
The suitability of writing the completion steps with the problem presented	• Explain the events or experimental results according to the problem being solved
Making conclusions	• Students can conclude (descriptions, experimental results, tables, and graphs) that are presented.

Adapted from Rosiani et al. (2020), Ningrum (2017), Ika (2018) and Yusefni & Sriyati (2016)

The data analysis technique used is the descriptive analysis technique with the assessment criteria shown in [Table 2](#).

Table 2. Criteria for assessing written communication skills

Scoring scale	Criteria
85 – 100	Excellent communication skills
70 – 82.5	Good communication skills
57.5 – 67.5	Sufficient communication skills
<55	Poor communication skills

(Ika, 2018)

RESULT AND DISCUSSION

Mathematical communication skills are very important for every student to have because with mathematical communication, students can verbally and in writing communicate mathematical ideas/ideas with symbols, tables, graphs/diagrams to clarify situations or problems in the form of mathematical structures through grammar. mathematics, mathematical problems or discourses, social/contextual problems about mathematics, and mathematical problem solving strategies which are all summarized in four aspects of mathematical communication skills (Dharma et al., 2019).

The communication skill test aims to identify students' written communication skills in science learning. The indicators of written communication ability on the test instrument consist of 1) changing the form of data presentation; 2) the accuracy of the use of notation, vocabulary, sketches, graphs, tables, and pictures; 3) the suitability of writing Steps to solve the problem presented and 4) draw conclusions. After the analysis was carried out, it was found that the average written communication ability of students as a whole was 47.48 in the poor category, with a profile that can be seen in [Figure 2](#).

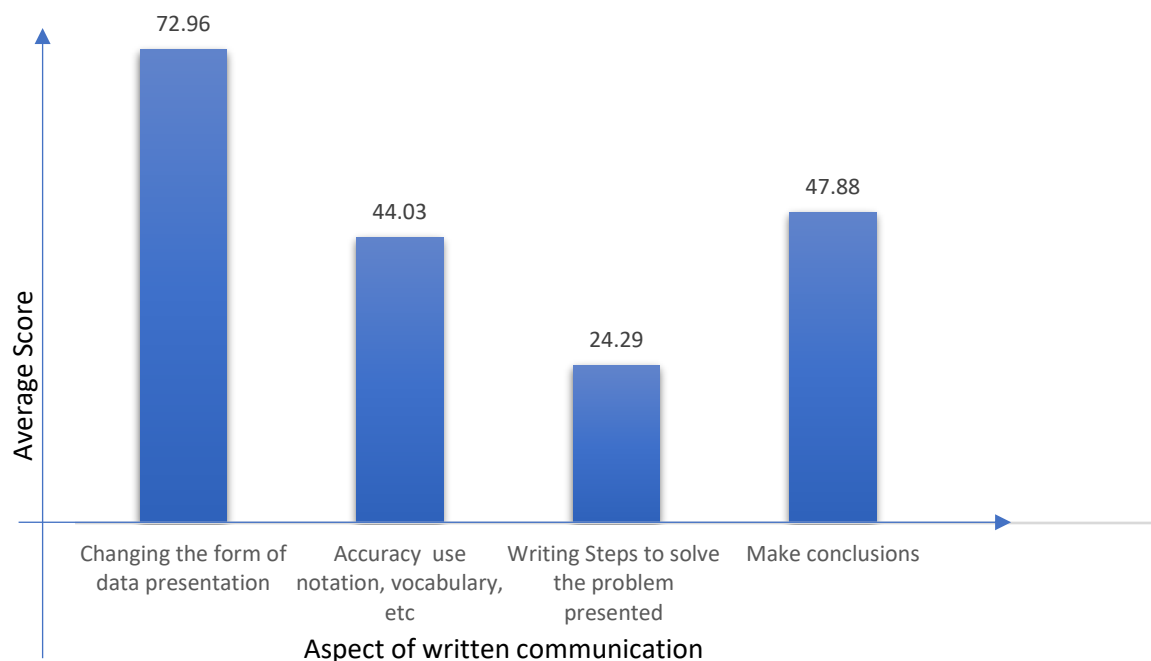


Figure 2. Profile of students' written communication skills

[Figure 2](#) shows that 39% of students can change the presentation form into various forms such as tables, graphs, and pictures. Besides that, 23% of all students can use graphs, tables, and pictures properly. In the aspect of the suitability of writing, the completion steps with the problems presented obtained a meager average percentage of 13%. In the last aspect, namely making conclusions, the average percentage of students who were able to make conclusions was 25%. It indicates that there are still many students who are not yet skilled in written communication. Furthermore, the researcher will further describe the profile of each written communication skills aspect of MTsN 4 Bengkalis students.

Aspects of Changing the Form of Data Presentation

According to [Misel and Suwangsih \(2016\)](#) students' representational abilities are someone's ability to present information/ideas that include the translation of mathematical problems or ideas into interpretations in the form of pictures, mathematical equations, or words. The ability of mathematical representation in the form of data presentation is very much needed by students this is because it can make it easier for students to solve mathematical problems in line with what [Pasehah & Firmansyah \(2020\)](#) said that doing mathematical modeling is a student's effort to find a solution to the problems they face. In this aspect, some indicators are represented by 3 sub-indicators as determinants of achieving the aspect of changing the form of data score. The score of students' written communication skills in this aspect can be seen in [Table 3](#) below.

Table 3. Profile of students' written communication on aspects of changing the form of data presentation

Aspect	Indicator	Sub Indicator	Score
Changing the form of data presentation	Change the form of data presentation into graphs, diagrams, pictures, or tables	Change the form of data presentation to tabular form	77,36
		Changing the form of data presentation in the form of graphs	62,74
		Changing the form of data presentation in the form of images	78,77

From the table, the average percentage of students' written communication in the aspect of changing the form of data score is 72,96, where this score is included in the excellent communication category. One of the questions that represent this aspect can be seen in [Figure 3](#).

Ratih conducted an experiment to determine the factors that cause vibration.

Tools & Materials	Trial Procedure
1. Load 100 gr 2. Rope with a length of 15 cm	1. Ratih tying the load with a rope 2. Ratih measures the number of vibrations with a stopwatch
Experiment Results	
1. In the first 5 vibrations it takes 4 seconds 2. At 10 vibrations it takes 7 seconds 3. At 15 vibrations it takes 10 seconds	

Present the experimental results of the pendulum vibration in tabular form!

Figure 3. The question of changing the form of data presentation in tabular form

[Figure 3](#) is a question used by the sub-indicators to change the presentation of data in tabular form. Students are asked to change the data from the experimental results into tabular form, some descriptions of the answers shown by students as respondents can be seen in [Table 4](#).

Table 4. Description of student answers about changing the presentation of data in tabular form

Answer Description	Subject percentage
No answer	0%
Wrong answer	0%
The independent variable and the dependent variable in the table are confused/inappropriate	17%
The independent variable and the dependent variable are correct, but the table is incomplete	57%
The independent variable and the dependent variable are precise, complete table	26%

Some of the students, 9 people, cannot put the independent variable and the dependent variable correctly. Related to whether or not the placement of independent and dependent variables affects the change in the presentation of the data in the form of graphs which will also be questioned in this aspect. However, in this aspect, the highest average communication ability was obtained compared to other aspects, namely 72,96.

Aspects of the Accuracy of Using Notations, Sketches, Graphs, Tables, and Drawings

The accuracy aspect of notation, sketches, graphs, tables, and images was developed into 3 sub-indicators. The percentage of written communication skills in this aspect can be seen in Table 5.

Table 5. Profile of students' written communication on aspects of the accuracy of using graphs, tables, and pictures

Aspect	Indicator	Sub Indicator	Score
of the accuracy of using the notation, vocabulary, sketches, graphs, tables, and, pictures	Using graphs, diagrams, models, and tables and giving the correct information and the appropriate scale	Using models/pictures and giving the correct information on the appropriate scale	42,92
		Using graphs and giving the correct information on the appropriate scale	35,38
		Using tables and giving the correct information on the appropriate scale	53,77

The table above displays the profile of students' written communication skills on aspects of the accuracy of the use of notation, sketches, graphs, tables, and pictures. It can be seen that the average scores of students' abilities in this aspect is relatively low, which is 44. One of the questions that represent this aspect can be seen in Figure 4.

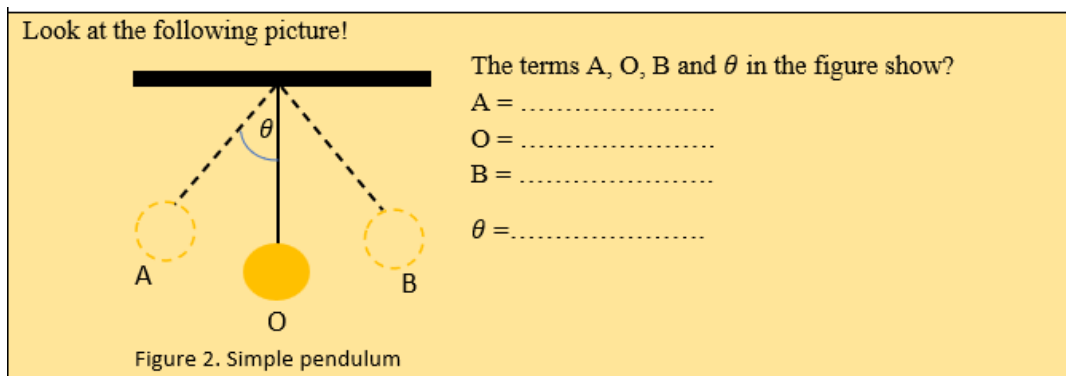


Figure 4. Questions using models/pictures and given the right information

Figure 4 displays questions representing the sub-indicators using models/images and giving the correct information and the appropriate scale. Descriptions of students' answers to this question can be seen in Table 6.

Table 6. Description of students' answers to questions using models/pictures

Answer Description	Subject percentage
No answer/ Wrong answer	28%
1 correct answer	15%
2 correct answers	25%
3 correct answers	21%
Overall/4 correct answers	11%

Based on Table 6, it can be concluded that many students only answered correctly 1 or 2 questions. It indicates the student has written communication skills in the aspects of the accuracy of notation, vocabulary, sketches, graphs, tables, and pictures still low.

The Aspects of Explaining Events or Experimental Results according to the Problems solved.

In this aspect, 2 sub-indicators were developed and displayed in 2 questions. The following is the percentage of students' written communication skills in the aspect of explaining events or experimental results according to the problems solved which are shown in Table 7.

Table 7. Profile of written communication skills on aspect 3

Aspect	Indicator	Sub Indicator	Score
Compatibility of writing Steps to solve the problem presented	Explain the events or experimental results according to the problem being solved	Explain events from the table according to the problems displayed	23,58
		Explain the events of discourse according to the problems that are displayed	25,00

Based on Table 7 which is represented a profile of students' written communication skills in the aspect of explaining events or experimental results according to the problems being solved. The average score of student communication in this aspect is very low, only 24.29. One of the questions that represent the sub-indicators in this aspect can be seen in Figure 5.

Read the following discourse

“Not All Tides Are Tsunamis”

Liputan6.com- "Since the Aceh tsunami disaster in 2004 ago, large tidal waves have often been beaten with the same name". The following is a table of differences between ordinary water waves and tsunami waves.

Table 3. Differences between ordinary water waves and tsunami waves

No	Nature	Ordinary water waves	Tsunami waves
1.	Place happened	Sea and river	sea
2.	Wavelength	10-200 meters	100-200 kilometers
3.	Speed	40km/h	600-900km/h

High tidal waves also occurred in Kampar, Teluk Meranti, Pelalawan Regency, Riau Province. This wave is called a bono wave which has a wavelength of 42 km, a wave height of up to 6 meters and a speed of 130 km/hour-Indonesiabaik.id

In your opinion, is it possible for a tsunami to occur in the bono wave area? Tell!

Figure 5. Questions explain events from the table according to the problems shown

The picture displays questions representing sub-indicators that explain events from the table according to the problems displayed. Descriptions of student answers can be seen in Table 8.

Table 8. The description of the answers to the questions explains the events from the table according to the problems displayed

Answer Description	Subject percentage
No answer	70%
Wrong answer, no reason	2%
Correct answer, wrong reason	9%
Correct answer, the correct reason is incomplete	2%
Correct answer, correct and complete reason	17%

From the following table, it can be concluded that many students decide not to answer question number 5. It could be due to a lack of student understanding of the questions, being panicked before answering the questions, lack of time, and also lack of reading literacy in students.

According to [Yusryah & Noordyana \(2021\)](#) some students are already able to use verbal representations, but some of them are still unable to write down their mathematical ideas in their own language. Meanwhile, according to [Purnamasari & Afriansyah \(2021\)](#) some students have not been able to write down their ideas in written form because students do not know the existing concepts and do not want to try more in learning mathematics or students need learning methods. In fact, students need learning that is innovative, interesting, and fun.

Aspects of Making Conclusions

The profile of students' written communication skills in this aspect can be seen in [Table 9](#).

Table 9. Profile of written communication on aspects of making conclusions

Aspect	Indicator	Sub Indicator	Score
Making Conclusions	Students can conclude (description, experimental results, and tables presented)	Making conclusions from the discourse/graphics displayed	43.87
		Making conclusions from the table presented	51.89

2 items represent this aspect. The average scores of students' written communication in this aspect is 48, where this scores is still included in the poor/low category. The following is one of the questions that represents this aspect.

Table 4. Speed of sound at a certain temperature

Gas material	Temperature (°C)	Speed of sound (m/s)
Air	0°	330
	10°	331
	15°	340
	20°	344

Based on the table, what is the relationship between temperature and the speed of sound?

Figure 6. The question of making conclusions from the table presented

The figure displays questions representing sub-indicators and draws conclusions from the table presented. Descriptions of student answers can be seen in [Table 10](#).

Table 10. Descriptions of answers to questions make conclusions from the table presented

Answer Description	Subject Percentage
No answer	38%
Wrong answer	13%
Correct answer, the correct reason is incomplete	13%
Correct answer, correct and complete reason	36%

From the table above, it can be seen that in this aspect, the number of students who choose not to answer tends to be greater than the percentage of other answer descriptions. The low ability of students to conclude has resulted from the teacher who does not involve students in the learning process and also in group work; this is following previous research [Nurliani et al. \(2018\)](#) students' skills in concluding are low, namely 35% this is due to the lack of concentration of students in reading information from questions. In addition, students are also not accustomed to making conclusions in learning. This is also supported by the research of [Putri et al. \(2022\)](#) that the indicator concludes that it is still with the lowest average of 53%. He also said that the lack of students' ability to draw conclusions is because students have never been trained in drawing conclusions.

CONCLUSION

Based on the results of research and discussion, it can be concluded that (1) Most students have not been able to communicate in writing well, (2) Written communication skills need to be improved by involving students as a whole in groups so that teachers can find suitable learning models, (3) Disadvantages on the ability of written communication is significantly seen in the aspect of explaining events or experimental results according to the problems solved and (4) the ability of students to change the form of data presentation is categorized as good.

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